

SEQUENCE LISTING

#6

<110> Eggeling, Lothar

Sahm, Hermann

<120> METHOD FOR MICROBIALLY PRODUCING L-VALINE

<130> 5899*13

<140> 09/914006

<141> 2001-08-21

<150> PCT/EP00/01405

<151> 2000-02-21

<160> 7

<170> PatentIn version 3.1

<210> 1

<211> 2952

<212> DNA

<213> Corynebacterium glutamicum

<400> 1

agtacttgga gcgccaaaag gcactgggca agccagttca gttgaacttc gatgacgaca 60
ccgatgggaa tacaacacaa acagaaagcg ttgaatccca agagaccgga caagccgcgt 120
ctgaaacctc acatcgtgat aaccctgcgt cacagcacta gagtgtaata agccgtccga 180

accaaaggtc cacacctctg cacgagtaga agctcaccca agttttcaaa gtgccgttga ttcttgacaa ccacccgccg ctctttagag cagatttgaa aagcgcatca tgatcccact tcgttcaaaa gtcaccaccg tcggtcgcaa tgcagctggc gctcgcgccc tttggcgtgc caccggcacc aaggaaaatg agttcggcaa gccaattgtt gccatcgtaa actcctacac ccagttcgtg cccggacacg ttcaccttaa gaacgtcggc gatattgtgg cagatgcagt gcgcaaagcc ggtggcgttc caaaggaatt caacaccatc gtcgatgacg gcatcgccat gggacacggc ggcatgctgt actccctgcc atcccgtgaa atcatcgccg actccgtcga atacatggtc aacgcacaca ccgccgacgc catggtgtgt atctccaact gtgacaagat caccccagge atgetcaacg cagcaatgeg cetgaacate ceagtggtet tegttteegg tggcccaatg gaagctggca aggctgtcgt cgttgagcgc gttgcacacg caccaaccga cctcatcacc gcgatctccg catccgcaag cgatgcagtc gacgacgcag gccttgcagc cgttgaacga tccgcatgcc caacctgtgg ctcctgctcc ggtatgttca ccgcgaactc catgaactgc ctcaccgaag ctctgggact ttctctcccg ggcaacggct ccactctggc aacccacgca gcacgtcgcg cactgtttga aaaggccggc gaaaccgtcg ttgaactgtg 1020 ccgccgctac tacggtgaag aagacgaatc cgttctgcca cgtggcattg ccaccaagaa 1080 ggcattcgaa aacgcaatgg cactggatat ggccatgggt ggatccacca acaccatcct 1140 ccacatecte geagetgeee aggaaggega agttgaette gacetegeag acategaega 1200 actgtccaaa aacgtcccct gcctgtccaa ggttgcacca aactccgact accacatgga 1260 agacgtccac cgcgccggtc gcattccagc actgctcggc gagctcaacc gcggtggcct 1320 gctgaacaag gacgtccact ccgttcactc caacgacctt gaaggttggt tggatgactg 1380 ggatateege tetggeaaga eeacegaagt ageaacegaa etetteeacg cageeceagg 1440 tggcatccgc accaccgaag cattctccac cgagaaccgc tgggacgaac tcgacaccga 1500 cgctgccaag ggctgcatcc gcgacgttga acacgcctac accgccgacg gcggcctggt 1560 tgttcttcgc ggcaacatct cccctgacgg cgcagtgatc aagtccgcag gtatcgaaga 1620 agagetgtgg aactteaceg gaccageacg agttgtegaa agecaggaag aggeagtete 1680 tgtcatcctg accaagacca tccaagctgg cgaagttctg gtcgtccgct acgaaggccc 1740 atcaggtgga ccaggcatgc aggaaatgct tcacccaacc gcattcctca agggatccgg 1800

240

300

360

420

480

540

600

660

720

780

840

900

960

cctgggcaag aagtgtgcac tgatcaccga cggccgtttc tccggaggtt cctcaggact 1860 gtccatcggc cacgtctccc cagaagcagc acacggcgga gtcattggtc tgatcgaaaa 1920 cggcgacatc gtctccatcg acgttcacaa ccgcaagctc gaagttcagg tctccgacga 1980 ggaactccag cgccgccgcg acgctatgaa cgcctccgag aagccatggc agccagtcaa 2040 ccgtaaccgc gttgtcacca aggcactgcg cgcatacgca aagatggcta cctccgctga 2100 taagggtgca gtccgtcagg tcgactaacc ctttgtgagt gtttgagcac cggttcccta 2160 ctttgggttc cggtgctttt tcatgtcttg gcctgtgtgg gcgtggtgga gctccccgtt 2220 gcaaatactc accacaagtt gcaggatttc tgctggttgt ggtggatttt cccgctttat 2280 agecetatge gtgcaacttt eggacegatt ecaaagggca aagecetgtt tgtggtggat 2340 ccttgccctg gaagctttca ggaaccacaa ctaccccact gaccccaaag tggataggcc 2400 ctattcttcc gtttaagcgc ctcaaacacc tctccccaca cttgacccat taggcaatta 2460 cgaatcctta aacagccttc tacagcacca tgccccaaac cgaacccagg catgaaaaag 2520 acceteacea ggagggtett tttetaaaac tttggetaeg egattgggtt cacaceegca 2580 ccgaaccacc acagcagaac tgccgctgcg atgccgatga ccacgaagat ccacgagctc 2640 accagtggac gctttgccca acctcggcca gagtcaaggg aaatcttgcc ggggccggtg 2700 aactgaagtc cgacaaccac gatagtgagg atcagtgcca gcatcaatgg ctcactaagt 2760 tcaccccaac caccttcatg agtgttgact tggtgaaggg tggtaaagga tgtcgccacc 2820 gtggctaccg ctgctgccac tggggtcatc agaccaagga gcaggaagac accagccgca 2880 agttcaatag atggaagcag gatcgcgagg atttcaggcc actggtaacc agcgaactct 2940 gcctcgactc ta 2952

<210> 2

<211> 612

<212> PRT

<213> Corynebacterium glutamicum

Met Ile Pro Leu Arg Ser Lys Val Thr Thr Val Gly Arg Asn Ala Ala 1 5 10 15

Gly Ala Arg Ala Leu Trp Arg Ala Thr Gly Thr Lys Glu Asn Glu Phe
20 25 30

Gly Lys Pro Ile Val Ala Ile Val Asn Ser Tyr Thr Gln Phe Val Pro 35 40 45

Gly His Val His Leu Lys Asn Val Gly Asp Ile Val Ala Asp Ala Val 50 55 60

Arg Lys Ala Gly Gly Val Pro Lys Glu Phe Asn Thr Ile Val Asp Asp 65 70 75 80

Gly Ile Ala Met Gly His Gly Gly Met Leu Tyr Ser Leu Pro Ser Arg 85 90 95

Glu Ile Ile Ala Asp Ser Val Glu Tyr Met Val Asn Ala His Thr Ala 100 105 110

Asp Ala Met Val Cys Ile Ser Asn Cys Asp Lys Ile Thr Pro Gly Met 115 120 125

Leu Asn Ala Ala Met Arg Leu Asn Ile Pro Val Val Phe Val Ser Gly 130 135 140

Gly Pro Met Glu Ala Gly Lys Ala Val Val Glu Arg Val Ala His 145 150 155 160

Ala Pro Thr Asp Leu Ile Thr Ala Ile Ser Ala Ser Ala Ser Asp Ala 165 170 175

Val Asp Asp Ala Gly Leu Ala Ala Val Glu Arg Ser Ala Cys Pro Thr 180 185 190

Cys Gly Ser Cys Ser Gly Met Phe Thr Ala Asn Ser Met Asn Cys Leu 195 200 205

Thr Glu Ala Leu Gly Leu Ser Leu Pro Gly Asn Gly Ser Thr Leu Ala 210 215 220

Thr His Ala Ala Arg Arg Ala Leu Phe Glu Lys Ala Gly Glu Thr Val 225 230 235 240

Val Glu Leu Cys Arg Arg Tyr Tyr Gly Glu Glu Asp Glu Ser Val Leu 245 250 255

Pro Arg Gly Ile Ala Thr Lys Lys Ala Phe Glu Asn Ala Met Ala Leu 260 265 270

Asp Met Ala Met Gly Gly Ser Thr Asn Thr Ile Leu His Ile Leu Ala 275 280 285

Ala Ala Gln Glu Gly Glu Val Asp Phe Asp Leu Ala Asp Ile Asp Glu 290 295 300

Leu Ser Lys Asn Val Pro Cys Leu Ser Lys Val Ala Pro Asn Ser Asp 305 310 315 320

Tyr His Met Glu Asp Val His Arg Ala Gly Arg Ile Pro Ala Leu Leu 325 330 335

Gly Glu Leu Asn Arg Gly Gly Leu Leu Asn Lys Asp Val His Ser Val 340 345 350

His Ser Asn Asp Leu Glu Gly Trp Leu Asp Asp Trp Asp Ile Arg Ser 355 360 365

Gly Lys Thr Thr Glu Val Ala Thr Glu Leu Phe His Ala Ala Pro Gly 370 375 380

Gly Ile Arg Thr Thr Glu Ala Phe Ser Thr Glu Asn Arg Trp Asp Glu 385 390 395 400

Leu Asp Thr Asp Ala Ala Lys Gly Cys Ile Arg Asp Val Glu His Ala 405 410 415

Tyr Thr Ala Asp Gly Gly Leu Val Val Leu Arg Gly Asn Ile Ser Pro 420 425 430

Asp Gly Ala Val Ile Lys Ser Ala Gly Ile Glu Glu Glu Leu Trp Asn 435 440 445

Phe Thr Gly Pro Ala Arg Val Val Glu Ser Gln Glu Glu Ala Val Ser 450 455 460

Val Ile Leu Thr Lys Thr Ile Gln Ala Gly Glu Val Leu Val Val Arg 465 470 475 480

Tyr Glu Gly Pro Ser Gly Gly Pro Gly Met Gln Glu Met Leu His Pro 485 490 495

Thr Ala Phe Leu Lys Gly Ser Gly Leu Gly Lys Lys Cys Ala Leu Ile 500 505 510

Thr Asp Gly Arg Phe Ser Gly Gly Ser Ser Gly Leu Ser Ile Gly His 515 520 525

Val Ser Pro Glu Ala Ala His Gly Gly Val Ile Gly Leu Ile Glu Asn 530 535 540

Gly Asp Ile Val Ser Ile Asp Val His Asn Arg Lys Leu Glu Val Gln 545 550 555 560

Val Ser Asp Glu Glu Leu Gln Arg Arg Arg Asp Ala Met Asn Ala Ser 565 570 575

Glu Lys Pro Trp Gln Pro Val Asn Arg Asn Arg Val Val Thr Lys Ala
580 585 590

Leu Arg Ala Tyr Ala Lys Met Ala Thr Ser Ala Asp Lys Gly Ala Val

Arg Gln Val Asp 610

<210> 3

<211> 2164

<212> DNA

<213> Corynebacterium glutamicum

<400> 3						
	accaattcct	ttaagaacca	tcagatcaat	ctgttgtaca	ttctcggcca	60
gattcagctt	ttcggtaagg	acgaaacact	ttcacttgaa	ı tcggcagcaa	agtttcttaa	120
agtttctaag	gcaactgcaa	cgaggtattt	tagaactctc	cgagaaatgg	aattagttca	180
cgaggtcagc	aaacgccctt	tgcggtttgc	gctcacggat	aaaggtcgtg	agatagtagg	240
tcttgaggta	aaaatttgac	tccataacga	gaacttaato	gagcaacacc	cctgaacagt	300
gaatcaaatc	ggaatttatt	tattctgagc	tggtcatcac	atctatactc	atgcccatgt	360
caggcattga	tgcaaagaaa	atccgcaccc	gtcatttccg	cgaagctaaa	gtaaacggcc	420
agaaagtttc	ggttctcacc	agctatgatg	cgctttcggc	gcgcattttt	gatgaggctg	480
gcgtcgatat	gctccttgtt	ggtgattccg	ctgccaacgt	tgtgctgggt	cgcgatacca	540
ccttgtcgat	caccttggat	gagatgattg	tgctggccaa	ggcggtgacg	atcgctacga	600
agcgtgcgct	tgtggtggtt	gatctgccgt	ttggtaccta	tgaggtgagc	ccaaatcagg	660
cggtggagtc	cgcgatccgg	gtcatgcgtg	aaacgggtgc	ggctgcggtg	aagatcgagg	720
gtggcgtgga	gatcgcgcag	acgattcgac	gcattgttga	tgctggaatt	ccggttgtcg	780
gccacatcgg	gtacaccccg	cagtccgagc	attccttggg	cggccacgtg	gttcagggtc	840
gtggcgcgag	ttctggaaag	ctcatcgccg	atgcccgcgc	gttggagcag	gcgggtgcgt	900
ttgcggttgt	gttggagatg	gttccagcag	aggcagcgcg	cgaggttacc	gaggatcttt	960
ccatcaccac	tatcggaatc	ggtgccggca	atggcacaga	tgggcaggtt	ttggtgtggc	1020
aggatgcctt	cggcctcaac	cgcggcaaga	agccacgctt	cgtccgcgag	tacgccacct	1080
tgggcgattc	cttgcacgac	gccgcgcagg	cctacatcgc	cgatatccac	gcgggtacct	1140
tcccaggcga	agcggagtcc	ttttaatgca	ggtagcaacc	acaaagcagg	cgcttatcga	1200
cgccctcctc	caccacaaat	ccgtcgggct	cgtccccacc	atgggtgcgc	tacacagegg	1260
acacgcctcg	ttggttaaag	cagcacgcgc	tgaaaacgac	actgttgtag	ccagtatttt	1320
tgtcaatccc	ctgcagtttg	aagcactcgg	tgattgcgat	gattaccgca	actatccccg	1380
ccaactcgac	gccgatttag	cactgcttga	agaggcaggt	gtggatattg	tgttcgcacc	1440
cgatgtggag	gaaatgtacc	ccggtggctt	gccactagtg	tgggcgcgca	ccggttccat	1500

cqqaacaaaa ttqqaqqqtq ccagcaggcc tggccatttc gatqgtgtgg ctaccgtggt 1560 ggcgaagctg ttcaatttgg tgcgccctga tcgtgcatat tttggacaaa aagatgctca 1620 gcaggttgcg gtgattcggc gattggttgc cgatctagac attcccgtgg agattcgtcc 1680 cgttccgatt attcgtggcg ccgatggctt agccgaatcc agccgcaatc aacgtctttc 1740 tgcggatcag cgagcgcaag ctctggtgct gccgcaggtg ttgagtgggt tgcagcgtcg 1800 aaaagcagct ggtgaagcgc tagatatcca aggtgcgcgc gacaccttgg ccagcgccga 1860 cggcgtgcgc ttggatcacc tggaaattgt cgatccagcc accctcgaac cattagaaat 1920 cgacggcctg ctcacccaac cagcgttggt ggtcggcgcg attttcgtgg ggccggtgcg 1980 gttgatcgac aatatcgagc tctagtacca accctgcgtt gcagcacgca gcttcgcata 2040 acqcgtqctc aqctcaqtqt ttttagqtqc gcgqtqcgqa tcgqaaccgg gagttggcca 2100 ctqcqqtqqc gtqqcctcac ccgacaqcqc ccatgccqcc tgacqaqctq cacccaacqc 2160 caca 2164

<210> 4

<211> 271

<212> PRT

<213> Corynebacterium glutamicum

<400> 4

Met Pro Met Ser Gly Ile Asp Ala Lys Lys Ile Arg Thr Arg His Phe 1 5 10 . 15

Arg Glu Ala Lys Val Asn Gly Gln Lys Val Ser Val Leu Thr Ser Tyr
20 25 30

Asp Ala Leu Ser Ala Arg Ile Phe Asp Glu Ala Gly Val Asp Met Leu 35 40 45

Leu Val Gly Asp Ser Ala Ala Asn Val Val Leu Gly Arg Asp Thr Thr 50 55 60

Leu Ser Ile Thr Leu Asp Glu Met Ile Val Leu Ala Lys Ala Val Thr 65 70 75 80

Ile Ala Thr Lys Arg Ala Leu Val Val Val Asp Leu Pro Phe Gly Thr 85 90 95

Tyr Glu Val Ser Pro Asn Gln Ala Val Glu Ser Ala Ile Arg Val Met 100 105 110

Arg Glu Thr Gly Ala Ala Ala Val Lys Ile Glu Gly Gly Val Glu Ile 115 120 125

Ala Gln Thr Ile Arg Arg Ile Val Asp Ala Gly Ile Pro Val Val Gly
130 135 140

His Ile Gly Tyr Thr Pro Gln Ser Glu His Ser Leu Gly Gly His Val 145 150 155 160

Val Gln Gly Arg Gly Ala Ser Ser Gly Lys Leu Ile Ala Asp Ala Arg 165 170 175

Ala Leu Glu Gln Ala Gly Ala Phe Ala Val Val Leu Glu Met Val Pro 180 185 190

Ala Glu Ala Ala Arg Glu Val Thr Glu Asp Leu Ser Ile Thr Thr Ile
195 200 205

Gly Ile Gly Ala Gly Asn Gly Thr Asp Gly Gln Val Leu Val Trp Gln 210 215 220

Asp Ala Phe Gly Leu Asn Arg Gly Lys Lys Pro Arg Phe Val Arg Glu 225 230 235 240

Tyr Ala Thr Leu Gly Asp Ser Leu His Asp Ala Ala Gln Ala Tyr Ile 245 250 255

Ala Asp Ile His Ala Gly Thr Phe Pro Gly Glu Ala Glu Ser Phe 260 265 270

<211> 279

<212> PRT

<213> Corynebacterium glutamicum

<400> 5

Met Gln Val Ala Thr Thr Lys Gln Ala Leu Ile Asp Ala Leu Leu His 1 5 10 15

His Lys Ser Val Gly Leu Val Pro Thr Met Gly Ala Leu His Ser Gly 20 25 30

His Ala Ser Leu Val Lys Ala Ala Arg Ala Glu Asn Asp Thr Val Val 35 40 45

Ala Ser Ile Phe Val Asn Pro Leu Gln Phe Glu Ala Leu Gly Asp Cys 50 55 60

Asp Asp Tyr Arg Asn Tyr Pro Arg Gln Leu Asp Ala Asp Leu Ala Leu 65 70 75 80

Leu Glu Glu Ala Gly Val Asp Ile Val Phe Ala Pro Asp Val Glu Glu 85 90 95

Met Tyr Pro Gly Gly Leu Pro Leu Val Trp Ala Arg Thr Gly Ser Ile 100 105 110

Gly Thr Lys Leu Glu Gly Ala Ser Arg Pro Gly His Phe Asp Gly Val

Ala Thr Val Val Ala Lys Leu Phe Asn Leu Val Arg Pro Asp Arg Ala 130 135 140

Val Ala Asp Leu Asp Ile Pro Val Glu Ile Arg Pro Val Pro Ile Ile 165 170 175 Arg Gly Ala Asp Gly Leu Ala Glu Ser Ser Arg Asn Gln Arg Leu Ser 180 185 190

Ala Asp Gln Arg Ala Gln Ala Leu Val Leu Pro Gln Val Leu Ser Gly 195 200 205 ·

Leu Gln Arg Arg Lys Ala Ala Gly Glu Ala Leu Asp Ile Gln Gly Ala 210 215 220

Arg Asp Thr Leu Ala Ser Ala Asp Gly Val Arg Leu Asp His Leu Glu 225 230 235 240

Ile Val Asp Pro Ala Thr Leu Glu Pro Leu Glu Ile Asp Gly Leu Leu 245 250 255

Thr Gln Pro Ala Leu Val Val Gly Ala Ile Phe Val Gly Pro Val Arg 260 265 270

Leu Ile Asp Asn Ile Glu Leu 275

<210> 6

<211> 26

<212> DNA

<213> Corynebacterium glutamicum

<400> 6
gagaacttaa tcgagcaaca cccctg

26

<210> 7

<211> 26

<212> DNA

<213> Corynebacterium glutamicum

<400> 7
gcgccacgcc tagccttggc cctcaa